

IN THE CLAIMS:

The status of each claim that has been introduced in the above-referenced application is identified in the ensuing listing of the claims. This listing of the claims replaces all previously submitted claims listings.

1-24. (Canceled)

25. (Currently amended) A fluorescence assay, comprising ~~the steps of~~:
providing a waveguide which is optically conductive and which has at least one surface having a plurality of capture oligonucleotides immobilized site-specifically to substantially all regions of the at least one surface having a base coating thereon, the base coating being located only on portions of the at least one surface, wherein the capture oligonucleotides have a binding site which selectively binds a selected analyte;
providing a light source operable to emit a light beam in a desired wavelength range and positioned to send light into the waveguide;
providing a detection element operably disposed to directly collect radiated fluorescence emitted from molecules located adjacent to a surface of the waveguide;
providing a sample comprising a buffer and a plurality of molecules of a selected analyte;
providing a plurality of tracer molecules which are operable to emit fluorescence in response to stimulation by an evanescent field adjacent to a surface of the waveguide;
combining the sample with the tracer molecules to produce a test solution;
placing the test solution in contact with the waveguide surface while operating the light source to direct light into the waveguide to generate the evanescent field; and
selectively and directly collecting radiated fluorescent light emitted from the tracer molecules.

26. (Currently amended) The assay of Claim 25, wherein ~~said step of~~ providing a waveguide with site-specifically immobilized capture oligonucleotides includes ~~the steps of~~:
coating the waveguide surface with ~~a first~~ the base coating to produce a coated surface;
providing a plurality of capture oligonucleotides;

modifying a single moiety which is the same on each capture molecule, to produce activated capture oligonucleotides having a modified moiety constructed to be coupled to the ~~first~~ base coating; and
treating the coated surface with the activated capture oligonucleotides under conditions to cause the modified moiety to couple to the ~~first~~ base coating and thereby immobilize the activated capture oligonucleotides to the waveguide surface.

27. (Currently amended) The assay of Claim 25, wherein ~~said first~~ the base coating is selected from the group consisting of: avidin, biotin, a hydrogel formed of polymethacryloyl polymers, and a modified polyethylene glycol.

28. (Currently amended) The assay of Claim 25, wherein an oligonucleotide primer acting as a capture oligonucleotide complementary to ~~said~~ the analyte is immobilized to ~~said~~ the waveguide by amine-reactive, thiol-reactive, or (strep) avidin-biotin coupling chemistry.

29. (Currently amended) The assay of Claim 25, wherein ~~said~~ the tracer molecules are complementary to a second sequence of ~~said~~ the analyte.

30. (New) An immunofluorescence assay, comprising the steps of:
providing a step-gradient waveguide which is optically conductive and which has at least one surface having a plurality of capture molecules site-specifically immobilized thereon, said capture molecules having a binding site which selectively binds a selected analyte;
providing a light source operable to emit a light beam in a desired wavelength range and positioned to send light into the waveguide;
providing detection means operably disposed for detecting fluorescence emitted from the step-gradient waveguide;
providing a sample comprising a buffer and a plurality of molecules of a selected analyte;
providing a plurality of tracer molecules which are operable to emit fluorescence in response to stimulation by light from the light source;

combining the sample with the tracer molecules to produce a test solution;
placing the test solution in contact with the step-gradient waveguide surface while operating said
light source to direct light into the step-gradient waveguide; and
selectively detecting fluorescent light emitted from the tracer molecules.

31. (Withdrawn) The assay of Claim 25, wherein said step of providing a step-gradient waveguide with site-specifically immobilized capture molecules includes the steps of:
coating the step-gradient waveguide surface with a first coating to produce a coated surface;
providing a plurality of capture molecules;
modifying a single moiety which is the same on each capture molecule, to produce activated capture molecules having a modified moiety constructed to be coupled to the first coating; and
treating the coated surface with the activated capture molecules under conditions to cause the modified moiety to couple to the first coating and thereby immobilize the activated capture molecules to the step-gradient waveguide surface.

32. (Withdrawn) The assay of Claim 25, wherein said first coating is selected from the group consisting of: avidin, a hydrogel formed of polymethacryloyl polymers, and a modified polyethylene glycol.

33. (Withdrawn) The assay of Claim 25, wherein an oligonucleotide primer acting as a capture molecule complementary to said analyte is immobilized to said step-gradient waveguide by amine-reactive, thiol-reactive, or (strep) avidin-biotin coupling chemistry.

34. (Withdrawn) The assay of Claim 25, wherein said tracer molecules are complementary to a second sequence of said analyte.